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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,321	04/19/2006	Kazunari Kurita	12054-0059	9391
22902	7590	07/26/2007		
CLARK & BRODY 1090 VERMONT AVENUE, NW SUITE 250 WASHINGTON, DC 20005			EXAMINER CHAET, MARISSA W	
			ART UNIT 1722	PAPER NUMBER
			MAIL DATE 07/26/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/576,321

Applicant(s)

KURITA ET AL.

Examiner

Marissa W. Chaet

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 7/24/06.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### *Double Patenting*

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

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Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

1. **Claims 1-2, 5 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 7-12, 17 of copending Application No. 10/512,405.** Although the conflicting claims are not identical, they are not patentably distinct from each other. Claim 7-12 and 17 of '405 include a method of producing a high-resistance silicon wafer having a resistivity of 100  $\Omega\text{cm}$  or more, oxygen concentration of  $14 \times 10^{17}$  atoms/ $\text{cm}^3$  or more, carbon concentration of  $0.5 \times 10^{16}$  atoms/ $\text{cm}^3$  or more, remaining oxygen concentration of  $12 \times 10^{17}$  atoms/ $\text{cm}^3$  or less by performing heat treatment performed at 700-900°C for 5 hours or more, a heat treatment performed at 950-1050°C for 10 hours or more, a heat treatment performed at 1100-1250°C for 1-5 hours, and a density of a grown-in defect of  $1 \times 10^3 / \text{cm}^3$ . Claims 1-2 and 5 of instant application include a method of producing a high-resistance silicon wafer having a resistivity of 100  $\Omega\text{cm}$  or more, oxygen concentration of  $13 \times 10^{17}$  atoms/ $\text{cm}^3$  or more, carbon concentration of  $5 \times 10^{15}$  -  $5 \times 10^{17}$  atoms/ $\text{cm}^3$ , remaining oxygen concentration of  $6.5 \times 10^{17}$  -  $13 \times 10^{17}$  atoms/ $\text{cm}^3$  by performing heat treatment performed at 700-900°C for 5 hours or more, a heat treatment performed at 850-1000°C for 0.5-5 hours employing a heat-up of 5°C - 10°C/minute, a heat treatment performed at 1150°C or above for 1-2 hours, and lowering the temperature to 1000-1150°C for 2-10 hours. It would have been obvious to one of ordinary skill at the time of the invention to include a grown-in defect amount to

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prevent contamination and to employ a heat-up rate of about 5°C - 10°C/minute to quickly increase the temperature.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

2. **Claims 1-2, 5-8 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 5-8, 10 of copending Application No. 10/519,837.** Although the conflicting claims are not identical, they are not patentably distinct from each other. Claims 1, 5-8, and 10 include a high-resistance silicon wafer having resistivity of 100  $\Sigma$ cm or more, oxygen concentration of  $8 \times 10^{17}$  atoms/cm<sup>3</sup> or more, carbon concentration of  $5 \times 10^{15}$  -  $5 \times 10^{17}$  atoms/cm<sup>3</sup>, remaining oxygen concentration of  $6.5 \times 10^{17}$  atoms/cm<sup>3</sup> or more, a heat treatment at 1000°C or higher, an epitaxial wafer, and a SOI wafer which is a bonded or SIMOX wafer. Claims 1-2 of the instant application include a method of producing a high-resistance silicon wafer having a resistivity of 100  $\Omega$ cm or more, oxygen concentration of  $13 \times 10^{17}$  atoms/cm<sup>3</sup> or more, carbon concentration of  $5 \times 10^{15}$  -  $5 \times 10^{17}$  atoms/cm<sup>3</sup>, remaining oxygen concentration of  $6.5 \times 10^{17}$  -  $13 \times 10^{17}$  atoms/cm<sup>3</sup> by performing heat treatment performed at 700-900°C for 5 hours or more, a heat treatment performed at 850-1000°C for 0.5-5 hours employing a heat-up of 5°C - 10°C/minute, a heat treatment performed at 1150°C or above for 1-2 hours, and lowering the temperature to 1000-1150°C for 2-10 hours. Claims 5-8 of the instant application include an epitaxial wafer, and a SOI wafer which is a bonded or SIMOX wafer. It would have been obvious to one of ordinary skill at the time of the invention to

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include a grown-in defect amount to prevent contamination and to employ a heat-up rate of about 5°C - 10°C/minute to quickly increase the temperature.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**1. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Falster et al. (US 2003/0008435) in view of Sadamitsu et al. (US 2005/0250349).**

2. Regarding claim 1, Falster discloses a process for producing silicon wafers wherein it comprises subjecting silicon wafers obtained by the Czochralski method and having a resistivity of about 10  $\Omega\text{cm}$ , an initial oxygen concentration of about  $5 \times 10^{17}$ - $9 \times 10^{17}$  atoms/ $\text{cm}^3$  and a carbon concentration of less than  $5 \times 10^{16}$  atoms/ $\text{cm}^3$  to first heat treatment temperature of about 850°C for about 1 hour employing a heat-up rate of about 5°C - 30°C/minute; and second heat treatment temperature from about 1100-1400°C for about 0.1-12 hours; followed by subsequent lowering of the temperature and heat treating at about 1050°C for at least about 5 hours. See para. 48, 52-53, 67-72, 94, 102-104, 108, 115, 122, 127. Falster discloses a resistivity of 10  $\Omega\text{cm}$ , however Sadamitsu discloses a process where the resistivity can be increased to 100  $\Omega\text{cm}$ . See

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para. 15. Thus, it would have been obvious to one of ordinary skill at the time of the invention to increase the resistivity to 100  $\Omega\text{cm}$ , such as suggested by Sadamitsu, to reduce the amount of carbon needed for preventing the generation of oxygen thermal donor.

3. Regarding claim 2, Falster discloses an initial oxygen concentration of greater than  $8 \times 10^{17}$  atoms/cm<sup>3</sup> and heat treatment and second heat treatment temperature from about 1100-1400°C for about 0.1-12 hours. See para. 67, 104, 127.

4. Regarding claim 3, Falster discloses first and second heat treatments carried out in a non-oxidizing atmosphere. See para. 85.

5. Regarding claims 4-5, Falster does not disclose oxygen donors. However, Sadamitsu discloses silicon wafers subjected to heat treatment where the amount of oxygen donors generated within the wafers of  $10^{14}$  atoms/cm<sup>3</sup> or less and where the residual oxygen concentration is  $6.5 \times 10^{17}$  atoms/cm<sup>3</sup> or above. See para. 19, 25. Thus, it would have been obvious to one of ordinary skill at the time of the invention to include the concentration of oxygen donors, such as suggested by Sadamitsu, to prevent reduction of the resistivity of the wafer.

6. Regarding claim 6, Falster discloses a method of producing epitaxial wafers wherein an epitaxial layer formed on the surface of the silicon wafers. See abstract.

7. Regarding claim 7, Falster discloses a method of producing SOI wafers wherein SIMOX type SOI wafers are produced using silicon wafers. See para. 126-127.

8. Regarding claim 8, Falster discloses SIMOX type, but not bond type SOI wafers. However, Sadamitsu discloses bond type SOI wafers. See para. 14, 34. Thus, it would

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have been obvious to one of ordinary skill in the art at the time of the invention to provide bond type SOI wafers, such as suggested by Sadamitsu, to prevent the generation of the oxygen donor.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marissa W. Chaet whose telephone number is 571-272-8094. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra N. Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MWC



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July 20, 2007

*/Robert Kunemund/*

*Robert Kunemund*

*Primary Patent Examiner*

*AU 1722*